

Optimal Assessment Procedures and Legal Standards in Antitrust Enforcement¹

Yannis Katsoulacos² and David Ulph³

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Abstract

In their contributions, that follow the decision-theoretic and welfare maximising traditions of analysing the choice of assessment procedures (or, legal standard, LS) for reaching liability decisions in competition law enforcement, Katsoulacos and Ulph (2009; 2016; 2020), provided a formal and general, yet simple representation, in terms of a condition expressed by a simple formula, of how many of the the fundamental pertinent factors that should determine the cost of error minimising choice interact, thus determining the optimal LS. However, their analysis relies on a significant abstraction, focusing on the comparison of the two extremes of Strict Per Se and the full Effects-based (or rule of reason) LS, ignoring the fact that CAs could choose, and they usually do, LSs intermediate between these two extremes.

In this article, we re-visit our previous contributions providing a much more detailed description of the process for choosing error minimising LSs, when the LSs are defined and distinguished by the extent to which they rely, for reaching liability decisions, on additional information gathering and investigations. Successive investigations determine whether additional preconditions (or screens, such as, significant market power, potential for exclusionary effects, potential for efficiencies, impact on prices etc), that are recognised as contributing to conducts having adverse welfare effects, are satisfied. Following the suggestion of Breckner and Salop (1999), we formulate a detailed methodology “for determining when to make (liability) decisions on the basis of current information and when to gather and consider further information before making a decision”. Further, in each stage of the process, given the information gathered up to that stage, we examine and compare LSs that rely on presumptions about the effect on welfare if just the preconditions up to that stage are satisfied, banning *all* conducts for which the preconditions are satisfied, to LSs that *discriminate* between whether specific conducts for which the preconditions are satisfied are harmful or benign. Simple formulae are derived that describe how to *determine whether a CA should rely on presumptions or discrimination and the value of additional information, in terms of lowering the costs of decision errors*.

Keywords: Legal standards, effects-based, Per Se, rule of reason.

JEL Classification: K21, L4.

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² Emeritus Professor, Athens University of Economics and Business. Affiliated Chair Professor Jiangxi University of Finance and Economics. Former Commissioner of Hellenic Competition Commission. Email: yanniskatsoulacos@gmail.com

³ Emeritus Professor of Economics, University of St Andrews. E-Mail: du1@st-andrews.ac.uk.

1. Introduction

The appropriate choice of *legal standards* (abbreviated henceforth to LSs) in competition law enforcement, that is, of the *decision procedures or decision rules*⁴ that provide the basis for how assessment of potentially anticompetitive conduct must be undertaken, has been hotly debated for many years. How widely divergent the opinions have been in this debate and how dominant specific points of view become, in terms of their influence on enforcement practice, has varied over time and across countries and continents. Broadly speaking, excluding hard-core horizontal agreements, for which there is broad unanimity that their treatment should rely on a strong presumption of illegality⁵, for most other conducts that come under antitrust scrutiny (vertical restraints and monopolisation, or abuse of dominance, practices), the US (or North America) enforcement has tended, at least in the last two decades, to rely on extensive use of economic analysis and evidence in case-specific investigations, that is, it has relied much more on a *rule of reason* than to a *Per Se* approach. But as many commentators have noted this has not been the case, to the same extent, in Europe⁶ where enforcement has

⁴ We recognise that a distinction is drawn by legal scholars between “rules” (a term that, in the context of antitrust, they reserve for *Per Se* decision procedures) and “standards” (like the “rule of reason”) – see Blair and Sokol (2012), Jones and Kovacic (2017) and for a very recent excellent and extensive discussion (and references) Kovacic (2021). As e.g. Blair and Sokol (2012, p. 472) write “The rule of reason involves a more open-ended inquiry than that of a *per se* analysis, moving antitrust away from rules and toward a standard”. Also, can see Araiza (2011) for a discussion extending beyond antitrust. Below, for simplicity, we neglect this terminological distinction and refer to all the “decision procedures” (which might be the most appropriate term for economists) that we discuss and compare (including the *Per Se* rule) as legal “standards”.

⁵ That is, the LS should be one of *Per Se* Illegality (in US) or by-object restriction (in EU). Though we recognise that these are not exactly equivalent LSs - see for an extensive discussion on this Katsoulacos and Makri, 2020 – for our purposes here they can be treated for much of the discussion as if they are, so below we will not distinguish between them. There are also some conducts (e.g. refusal to license know-how) for which there is broad agreement that they should be treated under *Per Se* Legality.

⁶ Both at the level of the EU Commission (EC) and that of Member States. The difference is thought to be particularly pronounced in abuse of dominance cases but also many vertical restraints. For an excellent overview of the application of economics in a century of antitrust enforcement in US see Kovacic and Shapiro (2000). As Gavil (2008) notes, after the *Sylvania* decision in US “the Court systematically went about the task of dismantling many of the *per se* rules...., and increasingly turned to modern economic theory to inform its interpretation and application of the Sherman Act”. See also Hovenkamp (2018) for a thorough and very thoughtful review on the rule of reason LS. Neven (2006) reviews the situation in EU, identifying low levels of economic analysis, especially in abuse of dominance cases. Geradin & Petit (2010) note that under a presumption of illegality, the assessment of such cases in the EU has relied on “old, formalistic legal appraisal standards, and (has shown) a reluctance to endorse a modern economic approach”. See also, Gual and Mas (2011), Papandropoulos (2010), Marsden (2010), Wils (2014), Rey and Venit (2015), Peepercorn (2015) and for a recent extensive review Ibanez Colomo (2016). On the other hand, focusing on the extent and type of economic analysis applied in the assessment of abuse of dominance cases by DGCOMP (rather than on the economic analysis utilised in the assessment of the appealed decisions of these cases by the EU Courts), Katsoulacos and Makri (2020) show that there has been a systematic and *substantial move towards effects-based* in the DGCOMP decisions in the last two decades.

relied more on *object-based* or on intermediate LSs rather than full *effect-based*⁷ and is certainly not true in other jurisdictions⁸.

The debate on the appropriate choice of LSs has gained in intensity and significance in recent years as part of the concerns expressed by a significant number of academics and policy makers in many countries that the current antitrust doctrines, rules and antitrust enforcement “are too limited to protect competition adequately, making it needlessly difficult to stop anticompetitive conduct in digital markets” and growing market power (Baker et.al. 2020)⁹. More generally, it has been argued, for US, that, “as a result of unsound economic theories and unsupported empirical claims about the competition effects of certain practices....antitrust rules constructed by the courts reflect a systematically skewed error cost-balance¹⁰: they are too concerned to avoid chilling procompetitive conduct and the high cost of litigation, and too dismissive of the cost of *failing* to deter harmful conduct”. Also, they have “encouraged overly cautious enforcement policies and overly demanding proof requirements and have discouraged government enforcers and private plaintiffs from bringing meritorious exclusionary conduct cases”¹¹.

In practice, the choice of LSs is influenced by a large number of considerations, that have been the subject of an extensive literature. The most important are: the desire to minimise decision errors¹²; the desire to minimise implementation / enforcement costs¹³; the deterrence effects

⁷ We will use the terms “effects-based” (popular in Europe, also as “economics-based”) and “rule-of-reason” (used in US) interchangeably though, as has been pointed out, Vickers (2007), under the latter there is greater discretion afforded to an agency / court than under the former. Intermediate LSs are described in detail below.

⁸ See the empirical findings of Katsoulacos, Avdasheva, Benetatou, Golovanova, Makri (2020) covering France, Greece and Russia as well as the EC.

⁹ “Joint Respose to the House Judiciary Committee on the State of Antitrust Law and implications for Protecting Competition in Digital Markets” by 12 of the most prominent economists and legal experts in US. OTHER REFERENCES AND OPPOSITE VIEWS CAN BE MENTIONED HERE.

¹⁰ For a very systematic and extensive criticism of this view, that has its origins in Easterbrook (1984), see Hovenkamp (2021). Gavil and Salop (2020) and Baker (2015) are also very critical. Gavil and Salop (2020) point out that “Many of the assumptions that guided this generation-long retrenchment of antitrust rules were mistaken, and advances in the law and in economic analysis have rendered them anachronistic. This is especially the case with respect to exclusionary conduct” (p. 6).

¹¹ Baker et.al (2020; p. 4-5). This situation has “been defended with reference to mistaken and unjustified assumptions – including erroneous claims that markets self-correct quickly, monopolies best promote innovation, firms with monopoly power can obtain only a single monopoly profit, vertical restraints..... almost invariably benefit competition even in oligopoly markets, courts and enforcers are manipulated by complaining competitors, and courts cannot tell whether exclusionary conduct harms competition or benefits it” (p. 5). The authors go on to devote a distinct section on legal rules.

¹² And, hence, on the factors that influence decision errors, on which our analysis here is dedicated. See below for additional discussion and references.

¹³ Grant and Sanghvi (2021) focus on these. They consider “the per se rule a profoundly economic approach to the problem that the demand for judicial resources exceeds its supply” (p. 99), recognising however that “Administrative convenience alone is not enough to justify the per se rule”, as the Leegin (2007) decision, to which they point out, shows (footnote 5), as well as the multitude of the other cases in which per se has been abandoned in US (and many other countries) – see also Kovacic (2021). Clearly, the welfare cost of decision errors and implementation costs are two sides of the same coin: choosing the most suitable LS must take both into account. On the other hand it is important to stress that in many cases (hard-core horizontal cartels been

and the legal uncertainty effects of different LSs¹⁴; reputational concerns of the CAs; the substantive (or liability) standards applied¹⁵. The first four considerations are encapsulated in the so-called *normative or welfare maximising approach* to the choice of LSs (Katsoulacos and Ulph, 2009, 2015, 2016, 2020). Reputational concerns can be important, given that when decisions are reached by different LSs, encapsulate economic analysis to a different extent and degree of sophistication, and thus are likely to be treated differently by Appeal Courts, leading to annulment rates of decisions that differ depending on the LS used – decision annulment influencing negatively the reputation and thus the utility of CAs (Avdasheva et.al., 2019; Katsoulacos, 2019b). Finally, the adoption of non-welfarist *substantive standards*¹⁶ will tend to lead to the choice of LSs closer to Per Se (Katsoulacos, 2019a).

In this article, we focus again on the considerations that have had the greatest influence on thinking in this area and that have been discussed most extensively and for a longer period than all others: the desire to minimise the welfare costs of decision errors¹⁷. Specifically, we revisit the following question: if minimising decision errors is the objective, as it is generally recognised that it should be, taking into account the size of enforcement costs (Easterbrook, 1984; Beckner and Salop, 1999; Hylton and Salinger, 2001; Evans and Padilla, 2005; Katsoulacos and Ulph, 2009 and for a very recent authoritative non-technical review applied to exclusionary conduct, Gavil and Salop, 2020¹⁸), what exactly are the factors that a CA or a court must take into account *and in exactly what way do these interact and influence the optimal choice of LSs?* While the above contributions added enormously to our understanding of what these factors are, they did not provide *a formal and general, yet simple representation, in terms of conditions expressed by simple formulae, of how the fundamental pertinent factors interact thus determining the optimal LS*. A first step in this direction was made by Katsoulacos and Ulph (2009), extended by their 2016 paper and followed by Seifert

the most obvious) Per Se rules minimise decision error costs – the existing analyses on decision errors and the one presented here explain exactly when this is the case (abstracting from implementation costs).

¹⁴ Easterbrook (1984); Lemley and Leslie (2008). See also, however, Katsoulacos and Ulph (2015 and 2016) who distinguish between different *types of legal uncertainty* and show that under many circumstances the rule of reason remains superior.

¹⁵ See for a brief review Katsoulacos, Avdasheva and Golovaneva (2016).

¹⁶ Such as “protecting the competitive process” or “non-disadvantaging rivals”. See for more details below.

¹⁷ More precisely, in the words of Beckner and Salop (1999), “minimising the expected consumer welfare costs of erroneous decisions” (p. 50). For early applications of this error-cost approach to legal rules see Ehrlich and Posner (1974) and Posner (1973).

¹⁸ Especially section II. As they note “ It has been recognized for decades that decision theory is useful for understanding and formulating legal standards. Making legal decisions based on probability, inferences, and presumptions is consistent with a decision-theoretic approach to legal rules. Decision theory provides a methodology for information-gathering and decision-making when outcomes are uncertain, information is inherently imperfect, and information is costly to obtain. This methodology is a rational process in which a decision-maker begins with initial beliefs (i.e., presumptions) based on prior knowledge and then gathers additional information (i.e., evidence) to supplement the presumption in order to make a better, more accurate decision” (p. 16).

(2020) and Katsoulacos and Ulph (2020), albeit on the basis of a comparison of the two extremes, of the Strict Per Se and the full Effects-based (or rule of reason) LSs, ignoring the fact that CAs often choose, and is usually more appropriate to choose, LSs intermediate between these two extremes.

The main contribution of this paper is to provide a detailed analysis of the factors influencing when decision errors are minimised and of how these factors interact, based on the recognition that the task facing CAs and Courts in order to reach decisions, is usually to choose *to what extent* their assessment should rely on *additional* distinct economic analyses and information gathering investigations that improve our ability to correctly discriminate between genuinely harmful and benign conducts of the same type. We think of the additional assessment tests as lying along a *sliding scale or continuum*, at the extremes of which are on the one hand assessments based purely on *presumptions* (the Strict Per Se, that relies on just the characterization of the conduct) and, at the other, assessments based purely on the findings of all potential case-specific economic analyses and tests that could influence the conduct's impact (full Effects-based, or rule of reason). The idea that "the modes of antitrust analysis represent a continuum, or "sliding scale" with different fact finding requirements for different situations" was initially developed in the *Antitrust Law* treatise of Areeda and Hovenkamp (....)¹⁹. This idea's articulation, that best represents our approach in this paper is that of Jones and Kovacic (2017). As they note "the general progression in U.S. doctrine has been toward recognition of an *analytical continuum* whose boundaries are set, respectively, by categorical rules of condemnation (*per se* illegality) or acquittal (*per se* legality) and an elaborate, fact-intensive assessment of reasonableness (Rule of Reason). These poles are connected by a range of intermediate tests that seek to combine some of the clarity and economy of bright-line rules with the greater analytical accuracy that a fuller examination of evidence can produce."²⁰ *In our approach, the range of intermediate tests is described by a sequence of steps or stages along the continuum, in each of which additional blocks or components of economic analysis are undertaken, generating additional information, building on the information already gathered in previous steps. The question then is whether it is best to add another step of economic analysis and hence move to a LS closer to full effects-based.*

The objective of each stage of the information gathering and analysis process is to examine whether certain *preconditions* are satisfied that are considered necessary for demonstrating

¹⁹ See also the detailed discussion in Hovencamp (2017, p. ; as noted there this was an idea discussed in all three previous editions of the Arreeda and Hovencamp treatise).

²⁰ Also, Kovacic (2021), Gavil and Salop (2020; p. 3, also referring to Gavil, 2012), Gavil (2008), p. 139 and Italianer (2013, p. 2), referring to Justice Stevens who was one of the first to point out that one should think of legal standards (for dealing with restraints under US Section 1) as forming a *continuum* with Per Se and Rule of Reason being at the opposite ends of this *continuum* (on Judge Stevens see also Azaira, 2019, who notes that "Justice Stevens has suggested that a judge better performs her role by paying careful attention to facts and context, as opposed to unthinkingly applying rigid legal rules"). As Italianer notes, the US Supreme Court has explicitly recognized that "the categories of analysis cannot pigeonholed into terms like "per se" or...."rule of reason". No categorical line can be drawn between them. Instead, what is required is a situational analysis moving along what the Court referred to as a "sliding scale".

liability (welfare harm) – such as significant extant market power, potential for exclusion, potential for consumer harm and potential for efficiencies. Then, decision error costs are compared across stages to determine the optimal LS. Further, below, given the information gathered up to a stage, we examine and compare LSs that rely on presumptions about the effect on welfare if just the preconditions up to that stage are satisfied, banning *all* conducts for which the preconditions are satisfied, to LSs that *discriminate* between whether specific conducts for which the preconditions are satisfied are harmful or benign. A paper that is clearly a very important predecessor to the present one is that of Breckner and Salop (1999). Indeed, what we do is to follow their suggestion of formulating a detailed methodology “for determining when to make (liability) decisions on the basis of current information and when to gather and consider further information before making a decision”²¹. Our formulation encapsulates all the main factors that should be taken into account in making this choice in simple, yet general, formulae that quantify and thus greatly facilitate comparisons of decision error costs between different options, which we consider an important contribution of the paper.

The formulae allow us to determine when we *should rely on presumptions or discriminatory decision procedures when assessing a specific conduct and, depending on this, the value of additional information, in terms of lowering the costs of decision errors, relative to the costs of decision errors without this additional information*. The value of additional information will depend on the improvement in *discriminating quality* – i.e. on the accuracy of discriminating between genuinely harmful from benign conduct. We agree with Breckner and Salop (1999) that, while decision theory cannot claim to be able to identify best antitrust standards to cover all restraints, this approach, allows competition agencies and courts to “better understand the key role of information in determining an appropriate antitrust standard. In this way, they can better balance the benefits and costs of additional information”. While closest to our analysis is the contribution of Breckner and Salop (1999), the papers of Hylton and Salinger (2001) and of Evans and Padilla (2005) are also important predecessors. They also contain examples²², in which one can identify all the main ingredients of our model / methodology. However, they do not attempt to put these together and develop a general yet simple representation of how exactly these interact in determining when to make (liability) decisions on the basis of current information and when to gather and consider further information before making a decision²³.

To appreciate the usefulness of this approach, one could for example think its application for comparing whether, when assessing tying arrangements, a Modified Per Se Illegality LS, under

²¹ Page 41 – 42. They refer to a number of other background papers to the decision-theoretic approach (p.42).

²² Constructed to illustrate the specific case of tying,

²³ Our approach is broadly similar in principle to that of Evans and Padilla (2005). They note that the choice of LSs involves, first, “formulating explicitly a set of presumptions regarding the cost and likelihood of errors resulting from condemning welfare-increasing business practices or condoning welfare-reducing ones. Second, based on those presumptions, a legal rule that minimizes the cost of errors is selected” (p. 6-7).

which we rely in order to reach a decision on certain contextualisation tests and the existence of significant market power, is preferable (in terms of decision errors) than strict Per Se Illegality under which there is no pre-requirement of extant market power; also, whether a Disadvantaging Rivals (truncated effects-based) LS is preferable to MPS Illegality – where, under the former, for illegality, significant market power is not enough, it is also required to demonstrate that rivals are likely to be excluded (in a broad sense) from the market by the conduct. Or, whether a full effects-based is preferable to the Disadvantaging Rivals LS. As noted by Evans and Padilla (2005), first, Strict Per Se and then later Modified Per Se Illegality have been the standards favoured for tying by both US and EU jurisdictions until about the end of the 1990s²⁴ and since then it has been decided to move to LSs closer to effects-based.

To give another example, the approach can be used to clarify and make precise why it makes sense to recommend that antitrust laws should be updated in order “to recognise that under some circumstances conduct that creates a risk of substantial harm should be unlawful even if the harm cannot be shown to be more likely than not”²⁵.

The paper is structured as follows. Section 2 describes in detail our methodology for measuring decision error costs. In Section 3 we examine and compare the decision-errors under Per Se and underEffects-Based and derive our main results. Section 4 concludes.

2. A Methodology for Measuring Decision Error Costs

2.1 The setting – preliminaries

Typically CAs, following a complaint or an *ex-officio* investigation, have to decide (the liability decision) whether or not a conduct violates competition law (below we focus on antitrust law, abstracting from merger control). Prior to reaching a liability decision, a CA must make a number of other decisions: a classification decision, a decision about whether the conduct is presumptively illegal or legal and a decision as to which LS to use in its liability assessment. Breckner and Salop (1999) refer to the first two decisions as “*the initial characterisation of the case*”²⁶.

The first (classification) decision means that the CA must first characterise the conduct as being, by virtue of its specific formal features, of a particular *type*²⁷. Next, drawing on knowledge of other cases involving this type of conducts, of relevant economic theory and

²⁴ Under this LS, tying is presumed to violate the law (i.e. it is considered presumptively illegal) when undertaken by dominant firms.

²⁵ Recommendation of group of US experts (Baker et. al., 2020; p.1) to Joint Judiciary Committee.

²⁶ See below.

²⁷ E.g. tying of products, engaging in exclusive dealing contracts, offering quantity discounts or fidelity rebates, refusing to deal with a rival firm etc. In each type, the formal characteristics of different cases are likely, of course, to be different. See also below about the initial characterisation stage of the assessment process.

evidence, and the information collected from the complainants and the firm(s) involved in the specific conduct, the CA can come to a view that a fraction γ , $0 < \gamma < 1$ of such cases²⁸ are genuinely harmful to consumer welfare²⁹, with (average) harm $H > 0$, while the remaining fraction are genuinely benign, with (average) benefit $B > 0$. Given this, the average harm across all cases is: $\bar{h} = \gamma H - (1 - \gamma)B$.

Knowledge about the values of these parameters need not be very precise³⁰ in the sense that what a CA actually needs to determine is just whether on average the conduct can be *presumed* to be harmful or benign, that is, whether:

- (i) $\gamma H > (1 - \gamma)B$ - in which case we say that the conduct is *presumptively illegal* (PI); or
- (ii) $\gamma H < (1 - \gamma)B$ in which case we say that the conduct is *presumptively legal* (PL).

Identifying whether (i) or (ii) holds essentially involves agencies or courts “creating presumptions³¹ through experience, to guide their factual investigations and decision making” (Breckner and Salop, 1999; also Gavil and Salop, 2020). CAs or courts have “initial information on the likelihood and magnitude of benefits and harms....(representing) preliminary presumptions for the entire class of similar (conducts) before gathering *additional case-specific* information”. As mentioned above, they refer to this as the “*initial characterisation of the case*”^{32, 33}. However, for the particular conduct in front of it, the CA

²⁸ This is what Hylton and Salinger (1999) call the “base rate” probability (p. 60).

²⁹ We assume throughout here that the substantive (or liability) standard is that of consumer welfare. This would seem to be the most appropriate assumption for North America: “In US since the end of 1970s, the Courts have accepted the view that antitrust law is a “consumer welfare prescription” (Jones and Kovacic, 2017; also, Hyman and Kovacic, 2013). But it is worth noting that recently there have been quite a few voices that have argued that this should change, and the emphasis should return to the protection of the competitive process (e.g. Werden & Froeb, 2018 and Wu, 2018). Indeed, Werden (2014) claims that, “commentators either have merely asserted that a welfare standard must be applied or mistakenly claimed that the Supreme Court has endorsed a welfare standard”. In the EU, the weaker substantive standard concerning the impact on competitors or to the «competitive process» has been favored by Courts (see for discussion and references, Katsoulacos, 2019a), though not necessarily the DGCOMP.

³⁰ In an adversarial system of enforcement, such as that of the US, estimates of the values of these parameters will be provided by the defendants and the plaintiffs.

³¹ Easterbrook (1984) emphasized the importance of presumptions in antitrust inquiries and thought that the open-ended rule-of-reason approach is often impractical - he advocated a more structured rule-of-reason inquiry when a Per Se rule is not used which may be considered closer to the concept of the rule of reason used here. For a recent very useful discussion in the context of applying decision theory see also Gavil and Salop (2020).

³² Page 53 – 54 - our emphasis. As they note (footnote 29), “the Supreme Court has expressly recognised the role that *a priori* presumptions play in the antitrust context”.

³³ Forming a presumption will also be influenced by “*prior beliefs*” that are, in the words of Evans and Padilla (2005) “independent of the facts of any specific case”. For the case of “unilateral practices” undertaken by dominant firms, they propose that three such “beliefs” should be taken into account: “(1) Many unilateral practices that have raised concerns are also widely used in competitive markets and therefore presumably result in efficiencies for firms or consumers. (2) Firms with the ability to cause consumer harm often do not have the incentives to do so, while firms that have the incentives to engage in anticompetitive practices often do not have the ability (monopoly power) to do so. (3) Condemning procompetitive practices is likely to be more costly, on average, than exonerating anticompetitive practices all else equal”. As noted above, there are many who have more recently argued that particularly belief (3) is false (Baker et.al.,2020; Hovencamp, 2021).

doesn't know whether it is harmful or benign, and so what decision – Ban, if it violates the law³⁴/Allow if it does not - to take.

Coming to the choice between alternative LSs, as already noted, the relevant literature often refers to two generic categories of LSs: the Per Se (or, using European terminology, object-based) and the Effects Based (or, using North American terminology, rule of reason) categories. a comparison of the two extremes, of the Strict Per Se and the full Effects-based (or rule of reason) LSs, ignoring the fact that CAs usually choose (and should choose) LSs intermediate between these two extremes. Thus, after undertaking a number, but not all, of the intermediate steps the presumption of illegality may be, on the basis of the evidence generated by these intermediate steps, sufficiently strong so that no additional steps need to be undertaken in order to reach the conclusion that the specific conduct should be banned, when account is also taken of the “additional costs of the legal process borne by *all* the parties affected by the litigation” (Breckner and Salop, 1999). We return with a detailed description of all the LSs below.

2.2 Assessment stages and preconditions (or, screens) for welfare harm

Here, we provide a stylised description of all the assessment stages of a conduct's investigation (or of all the steps of analysis) required if a *full effects-based* or, to use a term that has been used in the literature, a *structured rule of reason* assessment³⁵, was undertaken for establishing whether or not there is liability / violation of competition law – i.e., adverse effect on consumer welfare, in an abuse of dominance case (AoD). Other LSs are defined in terms of which of these steps of analysis are implemented or are not implemented. We abstract, for our purposes here, from explicit detailed discussions related to the “*burden of proof*” and its allocation, unless this is considered useful for clarifying our analysis³⁶. Experience with the practice of CAs indicates that it makes sense to assume that, in AoD cases, the steps of analysis will broadly follow the sequence that we propose below. The description of the analyses / tests that need to be undertaken in the various steps would be somewhat different if other conduct types (not exclusionary abuse of dominance practices) were to be considered. However, considering for example, vertical restraints, only the nature of stage 3 will be different. The differences would be greater for exploitative conduct. Nevertheless, our analysis of the factors determining the choice of how many steps of analysis to undertake

³⁴ If it decides to ban (or convict), this will usually be associated with the imposition of a monetary penalty and/or other sanctions. We abstract from this (important) feature of enforcement below, since we will abstract from the deterrence effects of different LSs (examined in Katsoulacos and Ulph 2009, 2015, 2016).

³⁵ Ahlborn et.al. (2004) note that this relies on a series of screens that are examined in a structured/sequential way (rather than traditional RoR in which there are no pre-described screens). See also Evans et. al (2006). Note, however, that in contrast to their use of the term, the structured application of specific tests in assessing specific conducts, *we use the term generically to denote the structured assessment of certain preconditions that need to be examined in order to identify harm, without relying on presumptions (that is, on forming priors or making inferences about preconditions for harm, without case-specific assessment of these preconditions)*.

³⁶ Gavil and Salop (2020) contain detailed references to the issues related to the burden of proof.

and, hence, of the choice of the optimal – i.e. the decision-error minimising LSs provided below can be equally applied to any of these other groups of conduct³⁷.

Beyond the initial stage, involving the *characterisation of the conduct* (stage 0), an investigation takes place in a number of *stages of economic analysis* ($i = 1, \dots, N$) in which a large number of factors can be analysed. These factors are considered important determinants for establishing whether certain preconditions are satisfied, each of which is regarded necessary for showing that there is liability (welfare harm). For AoD cases we take it that four preconditions must be successively examined ($N=4$). Thus, each stage is associated with the examination of a harm-conducive *precondition* and the objective is to investigate whether or not this precondition is satisfied: if in a stage, starting with stage 1, a precondition is found to be satisfied we can either continue with the investigation by proceeding to the next stage, or we can make a liability decision on the basis of the presumption and information already produced up to that stage; if in a stage the precondition is not satisfied, investigations can be terminated – i.e. a decision of no liability or acquittal can be made at that stage.

It is important to stress that while considering a sequence of four (or, including stage 0, five) distinct stages of analysis offers an organising framework for discussing all the main factors that influence each of the preconditions that must be satisfied for liability, the factors examined in each stage are relevant not just for determining the outcome in that stage but also in subsequent stages. For example, even in stage 0, certain contextualising factors examined will be relevant for stages, 1, 2 or 3 or may be used to form presumptions about the outcome in these stages. Further, the stages do not imply that each relevant factor is examined exclusively in one stage: analyses related to the characterisation of the conduct in stage 0 or analyses in stage 1 will also be undertaken and supplemented or extended in subsequent stages.

Given the above remarks, we can now describe each of the stages and sequence of screens for abuse of dominance conducts. In order to relate the discussion to the actual enforcement practice in EU and US we will use the example of the assessment of tying arrangements.

Stage 0: Initial characterisation of the conduct. This includes a detailed examination of all the relevant features of the conduct with a focus on those features that according to case law and established economic theory are considered most likely to influence the effects of the conduct. This conduct examination is often accompanied by a description of some basic market magnitudes such as the level of sales, that are an input to stage 2 and can be also considered as been part of that stage. For example, in tying cases, important factors examined are whether the products are separate and the customers are forced to buy both products

³⁷ We could undertake all the analysis under the assumption that there are $N > 1$ stages in the investigation and not specify the nature of these stages. However, we think that using an explicit description of the stages facilitates understanding of our approach and its practical policy significance.

(the Separate Product test), whether tying is contractual or technological and whether there is substantial amount of commerce in the tied product³⁸.

Stage 0 is followed by the following investigation stages:

Stage 1: Detailed contextualisation of the market(s)³⁹ and, most importantly, establishing that there is Significant Market Power (or Dominance). We have already mentioned the significance of extant MP in US enforcement in tying cases⁴⁰. This has also been true in EC enforcement. As noted by Nazzini (2017) in the EC Microsoft I and Microsoft II cases, Microsoft was considered to be dominant in client PC OSs, having very large and stable market share in a market characterised by strong barriers to entry and expansion, particularly in the form of network effects. Further, Microsoft was considered to have a leading position in the tied markets (of media players and internet browsers) that were also considered to be characterised by strong network effects. It is important to notice at this point the recent arguments, in the context of re-designing antitrust laws for the regulation of digital markets, that it *should not be a necessary requirement* to demonstrate significant extant market power in a specific relevant market⁴¹ in the assessment of conduct under article 102 in EC/EU and of Section 2 in US – so this should not be a necessary precondition of this stage. To take this into account, our analysis below would have to be modified in measuring decision error costs for decisions that rely on information just from stages 0 and 1.

Stage 2: Establishing that there is potential for significant exclusionary impact (or competition lessening effect). This can be manifested through the exit of a rival or rivals or through the marginalisation of rivals (so that they cannot exploit economies of scale and/or network effects or through the exclusion of potential entrants in the tying, the tied or a related market. Nazzini (2017) considers that in the EC Microsoft Media Player case the EC accepted that “it was necessary to prove that the tying of Windows to the WMP had an exclusionary effect” (p. 36) through an As-Efficient-Competitor test. I.e., that unlike the “classic” tying cases (of British

³⁸ These were the fundamental criteria in the assessment of tying arrangements in US until the early 1980s and indeed were considered sufficient for establishing that there is liability, “though Courts accepted that some form of market power (MP) was a necessary condition for harmful tying” (Ahlborn et.al, 2004). In our framework, the establishment of MP is part of the analysis undertaken in stage 2. Thus, to the extent that in practice there was a MP requirement, the rule used was not one of Strict Per Se Illegality as with hard-core cartels, in which if evidence of explicit agreements is recorded in stage 0 this is sufficient to presume anticompetitive, consumer welfare reducing effects. As noted by Padilla et.al. (2015) a Modified Per Illegality rule based on the above criteria (including MP in the tied market) was formalised with the Jefferson Parish case in 1984, in which the criteria “were used as proxies of anticompetitive harm, to provide a safe harbour”: with market share less than 30% the rule could not be applied but it was applied when market share exceeded 30%. This was confirmed in the Kodak case, though the Supreme Court accepted the possibility of illegal tying even in the absence of MP. The EU approach “was a carbon copy of the US approach” with the separate product test and evidence of MP been sufficient to presume anticompetitive harm. Thus, in both US and EU for a long time decisions in tying cases were reached on the basis of the analysis of our stages 1 and 2. This changed with Microsoft III case in US and the Microsoft Windows Media Player case in EU in which LSs closer to effects-based were proposed, implementing additional steps of analysis as we describe below.

³⁹ If, as in the tying cases there are more than one markets to consider, market power must be established in the tying and the tied market.

⁴⁰ This was a requirement even if in the tying cases examined under Section 1 of the Sherman Act.

⁴¹ Especially if this relies on demonstrating very high market share in the relevant market. See Baker et.al. (2020); p....and p. 14; also EC’s new regulations and Crawford and Reyon these.

Sugar, Hiliti and Tetra Pack) where exclusion was inferred from the analysis of stages 0 and 1, exclusion / foreclosure had to be demonstrated. Indeed, Nazzini (2017) argues that the EC went beyond a requirement for showing exclusion, by considering in detail the incentives of the defendants to act anticompetitively in order to maintain or strengthen MP in the tying market or to acquire, maintain or strengthen MP in the tied market, and examining entry barriers that would not allow entry after exclusion (which may be created by the anticompetitive conduct itself). However, the Court's position was that the presumption from stages 0 and 1 was strong enough to infer exclusion *without* needing to conduct the AEC test or additional analyses of the incentives of the defendants⁴².

Stage 3: Establishing that there is potential for consumer welfare loss *before accounting for efficiencies*. Salop (2017) provides an extensive discussion of how for many of the practices usually considered under AoD, exclusionary potential may or may not be associated with consumer welfare harm⁴³. Ideally, consumer welfare should be evaluated in terms of effects on prices, on output, on consumer choice (product variety), on quality and on innovation. Concentrating on consumer choice may mean reaching decisions on the basis of effects on "competitors", the exclusion of which may reduce consumer choice. This would be wrong however since there can well be an increase in consumer welfare even with less consumer choice.

Stage 4: Establishing lack of potential for significant efficiencies that can benefit consumers, specifically, establishing that *efficiencies are not sufficiently significant to outweigh the anticompetitive effect of the conduct*. There are a number of things to mention here. In both the EU and US defendants are (almost) always given the opportunity to defend themselves, that is, to offer arguments that their conduct is not harmful. In EU, defendants are always given the opportunity for a *rebuttal* of the plaintiffs' findings that there are anticompetitive effects, by arguing, for example in the case of tying, that tying is *objectively justified*, i.e., it pursues a legitimate objective, with tying been the most suitable and least restrictive way to achieve this objective, and with the benefits from the practice outweighing any anticompetitive effects. As Harrington (2020) notes in US there are also such defenses so "in practice, there does not seem to be much difference between the EU and US" – MENTIONED ALSO BELOW in this respect for either AoD practices or agreements.... In Stage 4 the CA examines and analyses in depth these efficiency arguments, collecting if it considers that this is necessary evidence itself, and, importantly, undertakes a balancing exercise to demonstrate whether or not the efficiencies are sufficient to outweigh the anticompetitive effects identified in stages 0 – 3 (in practice, given all the difficulties with balancing, this means, determining whether an output reduction and increase in price is still the most likely outcome)⁴⁴. It is important to stress that the efficiency arguments presented by the defendants can be reviewed (and are often reviewed) by the CA prior to stage 4 and can be

⁴² This was also the position of the GC in the Intel case that involved potentially abusive loyalty rebates.

⁴³ As noted we are assuming that the substantive or liability standard is one of consumer welfare, With a total welfare standard an additional investigation stage could be added.

⁴⁴ For details on balancing in practice see Hovenkamp (2018, p. 131 – 135).

dismissed / rejected as “wanting”⁴⁵. In cases involving tying arrangements efficiency arguments have been traditionally reviewed in stages 2 or 3 and there are no examples of successful defense under stage 4 (Ahlborn et al, 2004). Not undertaking stage 4 means that the CA reviews and considers the defendants defense arguments non-plausible (see Hovenkamp, p. 123 – 124).

It is natural to assume that if a precondition for liability, $i, i = 1, \dots, N-1$, is considered not to be satisfied this implies that the preconditions after stage i are also considered not to be satisfied (or do not need to be examined⁴⁶) and so, as mentioned, the investigation can be terminated at that stage with the acquittal of the conduct.

Most importantly, it is assumed that if all preconditions $i, i = 1, \dots, N$, are examined and are considered satisfied then harm to welfare is established with certainty, while until the last step is undertaken there is uncertainty about whether or not there is harm to welfare, which is, however, decreasing as more steps of analysis are undertaken. This in turn relies on the premise that we know the fraction of all conducts that are genuinely harmful and that whether or not a specific conduct is genuinely harmful can be established with accuracy after all the above preconditions have been assessed.

Finally, we assume that in step 0 the conduct to be investigated is classified without errors. Decision errors can be made, regarding the conduct’s contextualisation and assessment of preconditions in all other stages from 1 to N , as described in detail below.

2.3 Defining legal standards on the basis of the assessment steps undertaken (or screens examined) to reach a liability decision

2.3.1 Introduction

Undertaking an assessment step essentially:

- (i) Allows us to discriminate between cases in which a precondition is satisfied from cases where it is not (for example, in stage 1, discriminate between dominant and non-dominant firms) – albeit, with errors. Generally, let the probability that we correctly identify that the (harm-conductive) precondition in stage i holds be $\hat{p}_{H,i}$ (thus, for example, the probability that we correctly identify dominance is $\hat{p}_{H,1}$); also, let the probability that we correctly identify that the precondition in stage i does *not* hold be $\hat{p}_{B,i}$ (for example, the probability that we correctly identify non-dominance that is benign-conductive is $\hat{p}_{B,1}$).
- (ii) Allows us to update the probability that the conduct is genuinely harmful, given that following the initial characterisation of the conduct this probability is considered to be γ_0 . So if, for example, the firm is found to be dominant, the

⁴⁵ Hovenkamp (2018, p. 124). Indeed, in Canada efficiency defences are asked for and are then reviewed in stage 0 while in other countries in subsequent stages of the investigation – see Oxera (2015).

⁴⁶ Thus, the precondition in stage 4 is not relevant if no anticompetitive effect reducing consumer welfare can be established in stages 1 – 3. However, see also our discussion of stage 1 above.

probability that the conduct is harmful is updated and is considered to be $\gamma_1 > \gamma_0$. However, the signals generated by the investigation, given that a precondition is considered satisfied, about whether or not the conduct is or is not harmful are also subject to error: depending on the exact characteristics of the conduct and the exact characteristics of “dominance”⁴⁷ a stronger or a weaker signal of harm may be generated, given that some (one or more) of the preconditions for harm may not be examined (in subsequent stages). Specifically, we will say that, if the investigation identifies the firm as “dominant”, this allows us to identify the specific conduct as harmful when it is indeed harmful on average in a fraction $p_{H,1} < 1$ of the cases examined and to identify the conduct as benign when it is indeed benign on average in a fraction $p_{B,1} < 1$ of the cases. In other words, $p_{H,1}$ (resp. $p_{B,1}$) can be considered as the probability that a genuinely harmful conduct by a dominant firm will be banned (resp. a genuinely benign conduct by a dominant firm acquitted) if a decision is made following the investigation in step 1. This is very important in determining decision error costs from taking decisions in any given specific stage.

What we wish to stress here is that even though we may not wish to undertake a full analysis involving all the investigative/assessment steps, as we understand that not all conduct for which precondition $i < N$ is satisfied are harmful, we may not ban all of them, rather we may ban a fraction $p_{H,i}$ of them and acquit a fraction $p_{B,i}$. If $i = N$ and it is satisfied the conduct is certainly harmful so we ban with certainty, as further explained just below.

- (iii) If the last assessment step (N) is undertaken (which implies that all previous ones have been undertaken and all the preconditions in the previous steps were satisfied), and precondition N is also considered satisfied, then the conduct is considered to be *certainly* harmful (and can be banned without errors). So, in stage N either the precondition N is considered satisfied and the conduct is banned with certainty or precondition N is not considered satisfied and then the conduct is acquitted with certainty. Thus, in stage N, having completed all steps of analysis needed in order to establish welfare harm, the decision does not need any more to rely on presumptions about harm.

Of course in practice decisions may not rely on investigation-generated harm signals, in the sense described in (ii) above, in order to reach liability decisions. We could, for example, decide following the investigation in step 1 to convict *all* conducts when these are considered to be undertaken by dominant firms. This would be like using a (non-discriminating – see below) Per Se LS, but with the basis for presuming welfare harm not being the initial characterisation of the conduct (the case for which the term Per Se is usually deserved for) but the contextualisation undertaken in stage 1, that categorises firms as dominant or non-dominant. We return to this below.

2.3.2 A taxonomy of legal standards

⁴⁷ A firm may be assigned to the category of firms that are considered dominant with a 50% market share and with a 90% market share. Often the signal that the conduct of the latter will be harmful will be much stronger.

As is common in the literature, here too, when we refer to a specific LS been used we mean that a specific procedure is used that specifies how to reach a liability decision on a conduct. Specifically, the procedure should describe what information has to be obtained, what analyses have to be undertaken, what evidence has to be provided and what presumptions (if any) are to be relied upon in order to reach a liability decision, such as that there is an adverse consumer welfare effect. This means that the distinction between the strict Per Se and Rule of Reason LSs, involving either no investigations or the fullest possible investigations (involving the full range of the analysis steps) is a simplification of the real world. It cannot capture the richness of the various possibilities that can be used and are used in practice. To capture this richness *we will say that using LS_i means reaching a liability decision on the basis of the information, analyses, evidence and presumptions associated with steps/stages up to, and including, step i .*

In this context, two fundamental distinct aspects of a Per Se LS, often not succinctly explained, can be clarified. Under a Per Se LS, the totality of all conducts, for which a precondition for welfare harm is considered satisfied, are included in a category (e.g. all conducts undertaken by firms considered to be “dominant”, or all conducts with potential for significant exclusionary impact) and the totality of conducts for which the precondition is not considered satisfied in another category, and then the conducts in each category are treated in exactly the same way: those in the first category, including all conducts for which the precondition is considered to be satisfied are banned; while all conducts in the second category are acquitted. Note that a procedure for reaching liability in this way has two distinct aspects:

1. The first aspect is that *there is no attempt to undertake additional investigations* that could allow, through the examination of *additional* harm-conducive preconditions, a finer discrimination between harmful and benign conducts, rather than relying purely on a discrimination based on whether e.g. conducts are undertaken under dominance or not. Thus the Per Se illegality treatment of all conducts in a category, e.g. the category of conducts undertaken under dominance, relies on a *presumption* that in all additional investigations, following the stage 1 investigation, the preconditions would be satisfied, leading to a finding of welfare harm. In that sense, the term Presumption-Based LS can be used for or instead of, the term Per Se LS. The term Rule of reason or (full) effects-based refers to the LS under which decisions rely on the outcome of the investigations of *all* the stages – so all the preconditions for welfare harm are examined – and there is *no reliance on any presumptions*.
2. The second fundamental aspect of a Per Se LS is that, having decided to reach liability decisions following, for example, just the investigation of the precondition in stage 1 and without undertaking all other potential assessment steps, *all conducts are treated in exactly the same way*: banned when the precondition is considered satisfied and acquitted in the other case. Thus Per Se neglects the fact that, as noted above, if following stage 1 it is considered that the firm is dominant, this allows us to identify the specific conduct as harmful when it is indeed harmful on average in a fraction of $p_{H,1} < 1$ of the cases and to identify the conduct as benign when it is indeed benign on average in a fraction $p_{B,1} < 1$ of the cases. Clearly, even when a presumption-based LS is used based on the results of, say, just the assessment in stage 1, it is still possible

to use a *discriminating approach* banning just those of the dominant firms that on average we believe are undertaking harmful conducts, rather than banning the conduct of all firms that are categorised as dominant.

To capture these distinctions **below we distinguish between presumption-based LSs and Rule of Reason and for the former we distinguish between the sub-categories of discriminating and non-discriminating LSs.**

To complete this discussion, we note that the term Per Se is commonly and rather loosely deserved for the case in which the liability decision is based only on the initial characterisation of the conducts in stage 0. However, in EU the often similarly treated term object-based LS is deserved to categorise and reach decision on conducts on the basis of the initial characterisation and also the initial market contextualisation associated with stage 1. Further, in formal terms no conduct is strictly Per Se Illegal, in the sense that all (including hard-core cartels) are rebuttable under article 101 (3). The closest to a (strict) Per Se LS is that used in US to treat hard-core horizontal cartels⁴⁸. Below, to avoid confusion we will use Per Se only when we refer to the case where liability decisions rely purely on the categorisation involving the initial characterisation of the conducts in stage 0.

Following the discussion above, we distinguish between the following LSs and associated DECs.

- a) Strict Per Se (SPS) LS, henceforth referred to as LS_0 , is the LS under which the liability decision relies purely on the initial characterisation of the conduct (in step 0) and the presumption that this generates about its welfare impact.
- b) Presumption-based (henceforth, PB) LS_i , $i = 1, \dots, N-1$. Under a PB LS_i liability decisions rely on information from investigations up to step i , $0 < i < N-1$, and no further case-specific analysis / investigation is undertaken. From the information already collected by the i th and previous investigations a presumption is formed about whether or not the preconditions for welfare harm in the stages after i will be satisfied or not. Thus, when banning a presumptively illegal (PI) conduct in stage i , it is presumed that the preconditions after i , that must be examined in order to establish harm to welfare, will be satisfied. Two approaches for reaching a liability decision under PB LSs can be distinguished:
 - b.1) PB Non-Discriminating LS_i , henceforth referred to as $PBND LS_i$: under this *all* PI conducts for which precondition i is considered to be satisfied are banned, though it is recognised that precondition i is identified with errors and that some of the conducts for which the precondition are satisfied are not harmful.
 - b.2) PB Discriminating LS_i , henceforth referred to as $PBD LS_i$: under this, liability decisions are made on the basis of the understanding that if an assessment step shows a

⁴⁸ Further, as noted by Harrington (2020), in the US too there are always defenses in practice, so “in practice, there does not seem to be much difference between the US and the EU with regard to explicit agreements” (p. 10).

precondition $i = 1, \dots, N-1$ as satisfied, this allows us to identify the specific conduct as harmful when it is indeed harmful on average in a fraction $p_{H,i} < 1$ of the cases and to identify the conduct as benign when it is indeed benign on average in a fraction $p_{B,i} < 1$ of the cases (further details on these probabilities are provided below).

We note here that the choice between a discriminating and a non-discriminating LS makes sense when $\gamma_i < 1$ – the probability that the conduct is considered harmful is less than unity, which will apply in stages $i = 1, \dots, N-1$. Then, as mentioned, one can either ignore this and treat (as under strict Per Se) all conducts for which precondition i is satisfied as one category for which a uniform “ban” decision will be applied (ALL these conducts being presumed harmful) or one can try to discriminate between harmful and benign conduct for which precondition i is satisfied, *taking into account that there will be a range of different circumstances under which precondition i will be considered to be satisfied*, and this allows us to identify truly harmful conduct in a fraction $p_{H,i} < 1$ of the cases and to identify truly the conduct as benign in a fraction $p_{B,i} < 1$ of the cases.

- c) Rule of Reason or (full) Effects-Based LS, henceforth referred to as LS_N : under this, the liability decision relies on case-specific information from *all* assessment steps $i = 1, \dots, N$. So the distinguishing characteristic of this LS is that there is no reliance on presumptions when the liability decision is made. Given that there are no more investigation steps after step N , if the precondition N is considered satisfied for a conduct (and given that all the preconditions examined in the previous steps are also satisfied), the conduct is considered to be certainly harmful i.e. $\gamma_N = 1$, and there are no (false conviction) errors in banning it. If the precondition is considered not satisfied then (as with previous preconditions) it is acquitted with certainty. This means that when, as under RoR (i.e. under LS_N) all assessment steps are taken, there are no errors in step N in identifying harmful conducts among those for which precondition N is considered satisfied. That is, applying a discriminatory approach is irrelevant here. But there are still errors in stage N , though not in the decisions regarding harm. Precondition N may be mistakenly considered not to be satisfied when it is (leading to a false acquittal), and it may be mistakenly considered to be satisfied when it is not (leading to a false conviction).

Under Presumption-based LSs the literature has often referred to the following LSs:

- Modified Per Se Illegality LS (MPSI LS): under this a liability decision relies just on the information from stages 0 and 1 on the basis of which anticompetitive effect is inferred. This has, as noted above, been the LS adopted for a long time to treat tying arrangements in US and in EU (Ahlborn et.al. 2004; Nazzini, 20...) and other practices such as exclusive contracts and loyalty rebates...Under our terminology this is either a $PBND LS_1$ or $PBD LS_1$. For $PBND LS_i$: for tying arrangements the criteria related to the separate product test would classify MPSI as a $PBD LS_1$ i.e. as a discriminating $PB LS_1$. For conducts treated traditionally under a MPSI LS, it has been argued in the last two decades that they should be treated by a:
- Bright-line based LS: under this a liability decision relies just on the information from stages 0 and 1 but now if a bright-line criterion is satisfied (in EU this comes often in

the form of a market share that is less than or equal to 30% in vertical restraint cases) then there is acquittal while if the criterion is not satisfied (market share is greater than 30%) additional assessment is considered warranted. While this latter case the LS should in principle be a rule of reason LS in practice the EC in vertical restraint cases followed a MPSI LS (see Katsoulacos and Makri, 2020).

- Quick-look LS: under this a liability decision relies just on the information from stages 0 and 1 and sometimes on the effect to competitors assessed in stage 3, on the basis of which anticompetitive effect is inferred. This term is used essentially in discussions of US enforcement and it signifies that the Court reviews also (has a quick-look) on the efficiency defense presented by defendants (see Harrington, 2020; Hovenkamp, considers this LS as problematic and argues that it has rarely been used, 2018 p. 122-131).
- Truncated Effects Based (TEB) LS : under this a liability decision relies just on the information from stages 0, 1, 2 and 3, on the basis of which consumer harm is inferred without investigating and assessing the importance of efficiencies in stage 4. The term can also be used when it is decided to truncate stage 3 too, inferring consumer harm from the evidence on exclusionary effects.

2.3.3 *The potential liability decisions based on the Decision Error Costs following assessment in stage i*

A precondition examined in investigation stage i can be satisfied or not be satisfied: if satisfied the conduct can be harmful or benign; if it is not satisfied the conduct is certainly benign. Thus, having completed investigation i , the following decisions can be made:

- If precondition i , $i = 1, \dots, N$, is not considered to be satisfied, acquit the conduct in step i ;
- If precondition i , $i = 1, \dots, N-1$, is considered to be satisfied:
 - Decide whether the information and evidence collected up to step i is sufficient to reach an infringement decision or whether additional analyses and evidence should be sought, by comparing DEC under LS_i to DEC under LS_{i+1} . If DEC under LS_i are considered lower than DEC under LS_{i+1} , use LS_i to reach a liability decision, otherwise move to stage $i+1$ and LS_{i+1} . If it is decided to use LS_i , then:
 - Decide whether to use *PBND* LS_i or *PBD* LS_i by comparing their respective DEC;
 - Ban all conduct if it is decided to use *PBND* LS_i ;
 - Ban or allow the conduct depending on the strength of the harm signal received under a *PBD* LS_i (measured by the probabilities $p_{H,i} < 1$ and $p_{B,i} < 1$).
- If precondition $i = N$, is considered to be satisfied and given that examining precondition $i = N$ (the last one), implies that all previous preconditions were examined and considered to be satisfied, the conduct is considered certainly harmful, so $\gamma_N = 1$. In this case the conduct is either banned with certainty if precondition N is considered satisfied or is acquitted with certainty if precondition N is not considered to be satisfied (since then it is considered certainly benign).

3. Determining when additional assessment steps should be taken and LSs

3.1. Applying the methodology – parametrization

Introduction

We start by noting that below we measure the DEC associated with each one of the assessment stages $i = 0, \dots, 4$, as the error costs that would result if liability decisions (to condemn or to acquit) were taken in that stage. So, $DEC_i, i = 0, \dots, 4$, measures the DEC that would result if liability decisions are made on the basis of the information collected up to and including stage i . Of course, investigating the precondition associated with stage i presupposes that the preconditions associated with previous steps have been investigated and are considered to be satisfied. Measuring DEC in this way allows us to determine whether an additional assessment step should be undertaken (because it would lower DEC) as well as the optimal LS. Specifically:

- (i) if $DEC_1 < DEC_0$, it is optimal to take step 1; otherwise optimal LS is LS_0
- (ii) if $DEC_2 < DEC_1$, it is optimal to take step 2; otherwise optimal LS is LS_1
- (iii) if $DEC_3 < DEC_2$, it is optimal to take step 3; otherwise optimal LS is LS_2
- (iv) if $DEC_4 < DEC_3$, it is optimal to take step 4; otherwise optimal LS is LS_3

So, the RoR (LS_4) will be the optimal LS if:

$$DEC_4 < DEC_3 < DEC_2 < DEC_1 < DEC_0$$

Decision errors emerge because:

- it is not possible to determine with certainty whether a precondition for harm to welfare is or is not satisfied;
- when a precondition is satisfied, unless all investigations have been undertaken, it is not possible to determine with certainty whether the conduct is harmful or benign.

Of course, DEC will be different depending on whether decisions rely or not on presumptions and, when they are, depending on whether or not they are or are not discriminating.

Parametrization

Following the definition of parameters γ , H and B in Section 2.1 above we now need to also define the following parameters:

$\gamma_i, i = 1, \dots, N$, is the probability that conducts for which precondition i is genuinely satisfied are genuinely harmful to consumer welfare, given that the first $i - 1$ steps have been undertaken and satisfied⁴⁹. So if, for example $i = 2$, γ_2 is the probability that conducts of this general type (as determined in step 0), undertaken by dominant firms (established under $i = 1$), that have exclusionary effects (established under $i = 2$), lower consumer welfare. Clearly:

$$\gamma_0 < \gamma_i < \gamma_{i+1} < 1, i = 1, \dots, N - 1, \gamma_N = 1 \quad (1)$$

⁴⁹ Undertaking step i implies that the preconditions associated with the previous steps are considered satisfied.

This means that the fraction of genuinely harmful cases in the population of conducts for which precondition i is satisfied, given that the first $i - 1$ steps have been undertaken and satisfied, increases as i increases. Thus, the fraction of such cases in the population of dominant firms ($i = 1$), will be less than the fraction of such cases for which there is an exclusionary effect ($i = 2$), etc.

$\beta_i < 1, i = 1, \dots, N$ is the probability that the precondition examined in step i is genuinely satisfied given all preconditions in the previous investigative steps are satisfied; for example, β_1 is the probability that the conduct is undertaken by a dominant firm, while β_2 is the probability when undertaken by dominant firms this conduct type has exclusionary effects etc.⁵⁰

Instead of using the probability that precondition i is satisfied in the population of conducts for which the previous preconditions are satisfied, it is also useful to define:

$\hat{\beta}_i < 1, i = 1, \dots, N$, is the probability that precondition i is genuinely satisfied in the total population of conducts of the type examined. Clearly:

$$\hat{\beta}_1 = \beta_1, \hat{\beta}_2 = \beta_1\beta_2, \hat{\beta}_3 = \beta_1\beta_2\beta_3, \hat{\beta}_4 = \beta_1\beta_2\beta_3\beta_4; \hat{\beta}_1 > \hat{\beta}_2 > \hat{\beta}_3 > \hat{\beta}_4 \quad (2)$$

Note that:

$$\gamma_0 = \beta_1\gamma_1, \gamma_1 = \beta_2\gamma_2, \gamma_2 = \beta_3\gamma_3, \gamma_3 = \beta_4\gamma_4 = \beta_4 \quad (3)$$

and so:

$$\gamma_0 = \prod_{i=1}^4 \beta_i = \hat{\beta}_4, \gamma_1 = \prod_{i=2}^4 \beta_i, \gamma_2 = \prod_{i=3}^4 \beta_i, \gamma_3 = \beta_4, \gamma_4 = 1 \quad (4)$$

and

$$\beta_1\gamma_1 = \gamma_0 = \hat{\beta}_4 < \gamma_1 = \beta_2\gamma_2 < \gamma_2 = \beta_3\gamma_3 < \gamma_3 = \beta_4\gamma_4 = \beta_4 \quad (5)$$

Finally, it is clear from the above that [BELOW SHOULD BE $\hat{\beta}$]:

$$\beta_1(1 - \gamma_1) > \beta_2(1 - \gamma_2) > \beta_3(1 - \gamma_3) > \beta_4(1 - \gamma_4) \quad (6)$$

Also we define the following probabilities:

$\hat{p}_{H,i} < 1, i = 1, \dots, N$, is the probability that having undertaken investigative step i , the precondition examined in step i is considered satisfied when indeed this is the case. Clearly, $(1 - \hat{p}_{H,i})$ is the probability that the precondition examined in step i is erroneously considered as not satisfied and hence the conduct is acquitted.

$\hat{p}_{B,i} < 1, i = 1, \dots, N$ is the probability that having undertaken investigative step i , the precondition examined in step i is *not* considered satisfied when indeed this is the case.

⁵⁰ We comment on other parts of the paper how the value of these parameters can be assessed. To give an example here, a most important consideration for assessing the value of β_1 is whether without significant market power there is no incentive to undertake the conduct. If so (as, for example, in a refusal to deal or an exclusive deal case), β_1 is likely to be very high, otherwise (as for a number of tying practices) it will be low.

Clearly, $(1 - \hat{p}_{B,i})$ is the probability that the precondition examined in step i is erroneously considered as satisfied and hence the conduct is banned (if there is no further assessment after step i).

$p_{H,i} < 1, i = 1, \dots, N - 1$ ⁵¹ is the average fraction of the cases examined in which the conduct is identified as harmful when it is indeed harmful, having undertaken investigative step i ⁵². Clearly, $(1 - p_{H,i})$ is the average fraction of cases examined erroneously considered as benign (and acquired) for which step i is satisfied and which reduce consumer welfare.

$p_{B,i} < 1, i = 1, \dots, N - 1$ is the average fraction of the cases examined in which the conduct is identified as benign when it is indeed benign, having undertaken investigative step i . Clearly, $(1 - p_{B,i})$ is the average fraction of cases examined erroneously considered as harmful (and banned, if there is no further assessment after step i) for which step i is satisfied but which increase consumer welfare.

All the four last probabilities are assumed to have values between 0 and 1 reflecting the fact that analyses and tests are never perfect and there can be false convictions as well as false acquittals. Further, it is assumed that, the additional investigative steps and tests carried out have some *discriminatory power* so the probability of banning a harmful conduct is greater than the probability of banning a benign one and so:

$$p_{H,i} > 1 - p_{B,i} \quad (7)$$

As can be seen, this is equivalent to assuming that the probability of acquitting a genuinely benign conduct is higher than the probability of acquitting a genuinely harmful conduct.

Also it is assumed that

$$\hat{p}_{H,i} > 1 - \hat{p}_{B,i} \quad (8)$$

i.e. the probability that precondition i is considered to be satisfied when it is, is higher than when it is erroneously considered to be satisfied, when it is not.

It is finally natural to assume that

⁵¹ Note that in our framework it makes sense to define this and the next probability for stage $1, \dots, N-1$. In the last stage N , with all assessment steps completed, if the precondition in this stage, as all other preconditions, is considered satisfied the conduct is certainly harmful and banned whilst if the precondition is not considered satisfied the conduct is certainly acquitted.

⁵² These conditional probabilities are indeed recognised and taken into account by Hylton and Salinger (2001) in their discussion of the error cost-minimising legal standard for tying (see Section III, esp. p. 59-60 and Section V). As they note (p. 62), while it may not be “feasible to measure these factors directly, any proposed standard is based implicitly on assumptions about what they are. Moreover, in evaluating the implications of the academic literature for the legal standard, it is useful to consider what implicit assumptions had been built into the legal standards and then to assess what the implications of the literature are for how those assumptions should change”. Also note that we (implicitly) assume that if the evidence generated by the investigation doesn’t point to the conduct being harmful (resp. benign) it points to it’s being benign (resp. harmful). So we are ruling out “inconclusive” as a possible outcome of an investigation.

$$p_{H,i} < p_{H,i+1}, i = 1, \dots, N - 1 \quad (9)$$

$$p_{B,i} < p_{B,i+1}, i = 1, \dots, N - 1 \quad (10)$$

(9) and (10) say that the ability of the CA to recognise without errors genuinely harmful and genuinely benign conducts increases as the investigative steps and thus the information and evidence about the specific conduct examined increases.

From Section 1, in stage 0, without any other information, we say that the conduct is of a general conduct type which is presumptively legal (PL) or presumptively illegal (PI) depending on whether the average harm (\bar{h}_0) of this type of conducts is negative or positive, i.e. it is PL if

$$\bar{h}_0 = \gamma_0 H - (1 - \gamma_0) B < 0$$

and is PI if

$$\bar{h}_0 = \gamma_0 H - (1 - \gamma_0) B > 0$$

Having carried out i investigative steps, $i = 1, \dots, N$, we can say that the conduct is PL or PI depending on whether, respectively:

$$\bar{h}_i = \gamma_i H - (1 - \gamma_i) B < 0$$

or

$$\bar{h}_i = \gamma_i H - (1 - \gamma_i) B > 0$$

\bar{h}_i being the average harm of conducts for which precondition i is satisfied. Of course, $\bar{h}_i = H$.

The presumption of illegality vs. legality

As mentioned above at present in many jurisdictions (including those of North America and EU) only very rarely will a general conduct type be characterised as Presumptively Illegal (PI), without any additional contextualisation of the circumstances under which it is undertaken. Indeed, for AoD practices and most vertical restraints this is not the case and the general conduct types examined under these enforcement categories (such as) are characterised as PL. Of course, liability decisions on such conducts are never or very rarely taken using Strict Per Se: at least some case specific investigation is first undertaken. At a minimum, this in order to establish whether there is significant extant market power (step 1 of the investigative steps defined above). Having undertaken this step, if it is determined that the firms involved have SMP (or are dominant). Then the question becomes whether the general type of conduct, *when undertaken by dominant firms*, is PI or PL and what is the strength of this presumption. There are still significant differences in the answer to this question: the presumption formed and hence the view taken on whether a conduct is PI or PL will depend on the jurisdiction in which it is examined. ADD ABOUT DIGITALS – Baker, 2020 etc

In a jurisdiction in which the dominant economic ideology places greater trust on the markets' ability to self-correct (US model) and puts great weight on the incentive effects of false convictions⁵³ it is much more likely to characterize a conduct as PL than in a jurisdiction that does not place as much trust on markets' ability to self-correct, de-emphasizes incentive effects and places trust in the governments' ability to improve outcomes through intervention (EU model). In the latter it is much more likely to characterize a conduct as PI. This is, of course, a very important consideration in explaining the different enforcement approaches in US and EU mentioned in the Introduction⁵⁴.

ADD from HH (CPI, 2021).

Note now that:

Lemma 1: A PL conduct in step $i = 0, \dots, N-1$ can turn into a PI conduct in the next steps while a PI conduct in step $i = 0, \dots, N-1$ will be even more PI in the next step

Proof: true since γ_i is increasing with i .

In most of the cases that are the focus of our investigation (i.e. cases excluding horizontal agreements and specifically considering abuse of dominance practices or vertical restraints) there is unanimity that conducts are PL in step 0 but PI in step 1, i.e. when these conducts are undertaken by firms with SMP or dominant firms. If the conduct is considered PL in step 0 and is also PL in step 1 then it is unlikely that it will be condemned or be the subject of further investigation. So below we focus on cases where the conduct is PL in step 0 but PI in step 1, so $\bar{h}_0 < 0$ while $\bar{h}_1 > 0$.

A first question is whether, given these assumptions, we should pursue investigation 1, rather than use a strict Per Se rule and allow all the conducts in step 0. In the latter case, the DEC will be the cost of errors from false acquittals, i.e:

$$DEC_0 = \gamma_0 H \quad (11)$$

If the assessment in stage 1 lowers DEC then the question becomes whether additional information should be obtained in steps 2, 3 etc.

3.2 The Decision Error Costs from reaching liability decisions in each assessment stage

⁵³ Adverse deterrence effects or "chilling" effects. Another important factor is the significance attributed to the potential efficiencies generated by a conduct. As an example, Hylton and Salinger consider that for the case of tying "false acquittal costs are likely to be small relative to false convictions when there are (1) market constraints on the firm's conduct, (2) strategies other than tying that the firm could use to gain the same advantage in the market, or (3) no clear incentive to use tying in order to harm consumers. On the other hand, false conviction costs are likely to be relatively large when (1) there are substantial potential efficiencies associated with tying and (2) tying is an important competitive instrument".

⁵⁴ Indeed, Anu Bradford et.al.(2019) attribute to this difference in economic ideology the emerging "Global Dominance of European Competition Law Over American Antitrust Law".

To answer the question above and to compare DEC more generally, we now define the DEC for all the above types of LSs. They are the following.

a) DEC of Strict Per Se (SPS) LS

$DEC LS_0 = \gamma_0 H =$ DEC of False Acquittals if $\bar{h}_0 < 0$ (PL conduct) and $DEC LS_0 = (1 - \gamma_0)B =$ DEC of False Convictions if $\bar{h}_0 > 0$ (PI conduct)⁵⁵.

b) DEC of Presumption-based (PB) LS_i

b.1) DEC under a PB Non-Discriminating LS_i : under a PBND LS_i , $i = 1, \dots, N - 1$, with $\bar{h}_i > 0$ (conduct is PI), all conducts that are found to satisfy precondition i are banned, though not all preconditions for establishing liability have been investigated and it is understood that not all conducts that satisfy precondition i are harmful (and hence should not be banned). So, for example, in step 1, under PBND, all conducts in the category in which dominance is considered to be present are banned without any attempt to discriminate between those conducts in this category that are harmful from those that are benign – essentially, with this LS, it is presumed that all the preconditions that must be investigated in steps after step 1 in order to establish harm to welfare are satisfied. DEC are then given by:

$$DEC PBND LS_i = \hat{\beta}_i \hat{p}_{H,i} (1 - \gamma_i) B + \hat{\beta}_i (1 - \hat{p}_{H,i}) \gamma_i H + (1 - \hat{\beta}_i) (1 - \hat{p}_{B,i}) B \quad (12)$$

The first term on the RHS is the DEC (false convictions) from banning benign (probability $(1 - \gamma_i)$) conducts, that would generate welfare benefits B, for which precondition i is genuinely satisfied (probability $\hat{\beta}_i$), given that precondition i is considered to be truly satisfied with probability $\hat{p}_{H,i}$. The second term on RHS is the DEC (false acquittals) from acquitting harmful (probability γ_i) conducts, and thus incurring welfare loss H, for which precondition i is satisfied (with probability $\hat{\beta}_i$), given that precondition i is mistakenly considered not to be satisfied with probability $(1 - \hat{p}_{H,i})$. Finally, the third term on the RHS is the DEC (false convictions) from banning benign conducts and thus losing welfare benefit B, for which precondition i is not satisfied (with probability $(1 - \hat{\beta}_i)$), given that following the investigation it is mistakenly considered that precondition i is satisfied (with probability $(1 - \hat{p}_{B,i})$).

b.2) DEC under a PB Discriminating LS_i : under a PBD LS_i , $i = 1, \dots, N - 1$, with $\bar{h}_i > 0$, not all conducts that are found to satisfy precondition i are banned, which is the difference between this LS and PBND LS_i . DEC in this case are:

$$DEC PBD LS_i = \hat{\beta}_i \hat{p}_{H,i} \gamma_i (1 - p_{H,i}) H + \hat{\beta}_i \hat{p}_{H,i} (1 - \gamma_i) (1 - p_{B,i}) B + \hat{\beta}_i (1 - \hat{p}_{H,i}) \gamma_i H + (1 - \hat{\beta}_i) (1 - \hat{p}_{B,i}) B \quad (13)$$

There is now an additional false acquittals DEC term from not banning harmful conducts (the first term on the RHS of equation (13)) with probability $(1 - p_{H,i})$. The false convictions DEC term, second term on the RHS of equation (13) now changes compared to $DEC PBND LS_i$ - first term of (12): false convictions, from banning conducts for which precondition i is satisfied

⁵⁵ See also, Breckner and Salop, 1999. And, Hylton and Salinger (2001), p. 63.

even though they are benign, are now lower, given that now a fraction of these, $(1 - p_{B,i})$, are banned. The 2nd term on the RHS of $DEC\ PBN\ D\ LS_i$ in (12) is the same as the 3rd term in equation (13). The 4th term in (13) – same as 3rd term in (12) - shows DEC from false convictions of benign conducts for which precondition i is not satisfied but this is not recognised, and so they are banned.

c) DEC of Rule of Reason or (full) EB LS (LS_N): as explained above under this LS if precondition N is considered satisfied the conduct is banned with certainty given that $\gamma_N = 1$. As noted, this cannot be a discriminating LS, since the latter can be used when we want to discriminate between harmful and benign conducts when precondition i is satisfied. And, if precondition N is considered not-satisfied the conduct is acquitted with certainty. Thus, depending on the finding regarding precondition N, conducts are treated in exactly the same way - all those for which the precondition is considered satisfied are banned and all those for which the precondition is considered not satisfied are acquitted. This is as for the case of $PBN\ D\ LS_i, i = 1, \dots, N - 1$. So from (12) (DEC for $PBN\ D\ LS_i$) the DEC for the Rule of Reason are:

$$DEC\ LS_N = \hat{\beta}_N(1 - \hat{p}_{H,N})H + (1 - \hat{\beta}_N)(1 - \hat{p}_{B,N})B \quad (14)$$

So now there are DEC from false acquittals from wrongly acquitting conducts for which precondition N is satisfied but this is not recognised and DEC from false convictions from wrongly convicting conducts for which precondition N is not satisfied but, again, this is not recognised.

3.3 Determining the Optimal Number of Assessment Steps and LSs

We can now prove a number of results about whether additional assessment steps should be undertaken and thus the determination of LSs. To start with we define the following indicators:

$\frac{\gamma_i H}{(1 - \gamma_i) B} = \bar{h}_i > 1$, this measures the “*strength of the presumption of illegality*” (s_i) in stage i, i.e. the strength of the presumption that the conduct is harmful, when the preconditions for welfare harm in i and before i ($i = 1, \dots, N-1$) are considered satisfied.

$\frac{(\hat{p}_{H,i})}{(1 - \hat{p}_{B,i})} > 1$, this measures the “*discriminatory power*” (\hat{d}_i) in identifying correctly when precondition i is satisfied.

$\frac{p_{H,i}}{(1 - p_{B,i})} > 1, \frac{p_{B,i}}{(1 - p_{H,i})} > 1$, these measure the “*discriminatory power*” ($d_{H,i}, d_{B,i}$) of presumption-based discriminatory LSs (PBD LSs) in identifying correctly when the conduct is harmful and when it is benign, given that precondition i is satisfied⁵⁶.

$\left(\frac{\hat{\beta}_i}{1 - \hat{\beta}_i}\right)$, this measures the “*degree of prevalence*” (\hat{w}_i) of the precondition i, i.e. the extent to which the presence of the precondition is widespread in the market under consideration.

⁵⁶ These terms were first used by Katsoulacos and Ulph (2009).

Proposition 1: Conditions for undertaking step 1, i.e. for not adopting Strict Per Se

Assume that the conduct is PL in step 0 but PI in step 1, so $\bar{h}_0 < 0$ while $\bar{h}_1 > 0$. It is then optimal to proceed with the step 1 investigation, as this will lower DEC relative to a Strict Per Se treatment of the conduct, when γ_1 and hence s_1 , \hat{w}_1 and $\hat{d}_{H,1}$ are quite large.

Proof: we need to compare $DEC LS_0 = \gamma_0 H$, given $\bar{h}_0 < 0$, with $DEC PBND LS_1$ and $DEC PBD LS_1$. For the result to hold at least one of the two latter should be lower than the former. Comparing first with the $DEC PBND LS_1$, we get, given that $\gamma_0 = \beta_1 \gamma_1$ and $\hat{\beta}_1 = \beta_1$:

$DEC LS_0 > DEC PBND LS_1$ if:

$$\gamma_0 H > \hat{\beta}_1 \hat{p}_{H,1} (1 - \gamma_1) B + \hat{\beta}_1 (1 - \hat{p}_{H,1}) \gamma_1 H + (1 - \hat{\beta}_1) (1 - \hat{p}_{B,1}) B \quad (15)$$

i.e., if, $\hat{\beta}_1 \hat{p}_{H,1} (1 - \gamma_1) B - \hat{\beta}_1 (\hat{p}_{H,1}) \gamma_1 H + (1 - \hat{\beta}_1) (1 - \hat{p}_{B,1}) B < 0$

$$\left(\frac{1 - \hat{\beta}_1}{\hat{\beta}_1}\right) \frac{(1 - \hat{p}_{B,1})}{\hat{p}_{H,1}} < (1 - \gamma_1) \left[\frac{\gamma_1 H}{(1 - \gamma_1) B} - 1\right] \text{ or}$$

$$1 < (1 - \gamma_1) \left[\frac{\gamma_1 H}{(1 - \gamma_1) B} - 1\right] \left(\frac{\hat{\beta}_1}{1 - \hat{\beta}_1}\right) \frac{(\hat{p}_{H,1})}{(1 - \hat{p}_{B,1})} \quad (15')$$

Or, using the notation of the indicators introduced above:

$$(1 - \gamma_1) \hat{w}_1 \hat{d}_1 (s_1 - 1) > 1 \quad (16)$$

[CAN GENERALISE TO CASE WHERE i IS PL AND $i + 1$ IS PI] The condition says something eminently intuitive: it is more likely to be optimal to take step 1 and then adopt, all other things equal (i.e., before determining whether it will be optimal to take additional steps), a PBND LS:

- the more widespread are dominant firms in the market for the type of conduct examined (the greater \hat{w}_1);
- the more likely that the conduct is harmful given it is undertaken by a dominant firm – note here that as γ_1 increases the strength of the presumption of illegality s_1 increases and $(1 - \gamma_1)(s_1 - 1)$ increases with γ_1 ;
- the greater the discriminatory power in distinguishing dominant from non-dominant firms (\hat{d}_1).

Note also that all these parameters / indicators are potentially different when we consider the same conduct types and markets across different economies and jurisdictions in which market structures and other characteristics are different. Thus these indicators can provide the basis for developing empirical hypotheses about why there are differences in LSs adopted for similar type of conduct in different countries.

Next, we see that compared to a PB discriminatory LS:

$DEC LS_0 > DEC PBD LS_1$ if:

$$\gamma_0 H > \hat{\beta}_1 \hat{p}_{H,1} \gamma_1 (1 - p_{H,1}) H + \hat{\beta}_1 \hat{p}_{H,1} (1 - \gamma_1) (1 - p_{B,1}) B + \hat{\beta}_1 (1 - \hat{p}_{H,1}) \gamma_1 H + (1 - \hat{\beta}_1) (1 - \hat{p}_{B,1}) B$$

or, given that $\gamma_0 = \beta_1\gamma_1$ and $\hat{\beta}_1 = \beta_1$ and re-arranging, if:

$$\hat{\beta}_1\hat{p}_{H,1}\gamma_1p_{H,1}H - \hat{\beta}_1\hat{p}_{H,1}(1 - \gamma_1)(1 - p_{B,1})B - (1 - \hat{\beta}_1)(1 - \hat{p}_{B,1})B > 0 \quad (17)$$

Or

$$\hat{\beta}_1\hat{p}_{H,1}(1 - \gamma_1)\left[\frac{\gamma_1H}{(1-\gamma_1)B}p_{H,1} - (1 - p_{B,1})\right] - (1 - \hat{\beta}_1)(1 - \hat{p}_{B,1}) > 0 \quad (18)$$

Or:

$$(1 - \gamma_1)\hat{w}_1\hat{d}_1[(s_1p_{H,1} - (1 - p_{B,1}))] > 1 \quad (19)$$

Comparing (19) with expression (16) we see that

$$s_1p_{H,1} - (1 - p_{B,1}) > s_1 - 1 \text{ if}$$

$$d_{B,1} > s_1 \quad (19')$$

That is, if the discriminatory power of the discriminating LS is higher than the strength of the presumption of illegality in stage 1, (19) is more likely to hold than (16), that is we have:

Proposition 2: Comparison of discriminating to non-discriminating PB LSs (stage 1)

The discriminating LS *PBD LS*₁ is more likely to lower DEC relative to the use of the SPS LS than the non-discriminating LS *PBND LS*₁ when the discriminatory power of the discriminating LS is higher than the strength of the presumption of illegality in stage 1 .

Next we can compare PB LSs in any given stage. We can do this for stage i, i = 1,....N. First we compare PBND LSs to PBD LSs and given a general proof that condition (19') is a sufficient condition for a discriminating LS to be superior in stage i < N to a non-discriminating LS.

Proposition 3 (general comparison of the two types of presumption-based LSs):

Comparing the DEC of discriminatory and non-discriminatory PB LSs, the *PBD LS*_i, will be superior to a *PBND LS*_i, i = 1,....,N-1, if the discriminatory power of *PBD LS*_i ($d_{B,i}$) following the investigation in step i is higher than the strength of the presumption of illegality of the conduct for which precondition i is considered to be satisfied.

Proof: must examine when $DEC\ PBND\ LS_i > DEC\ PBD\ LS_i$. This will be true if:

$$\hat{\beta}_i\hat{p}_{H,i}(1 - \gamma_i)B + \hat{\beta}_i(1 - \hat{p}_{H,i})\gamma_iH + (1 - \hat{\beta}_i)(1 - \hat{p}_{B,i})B > \hat{\beta}_i\hat{p}_{H,i}\gamma_i(1 - p_{H,i})H + \hat{\beta}_i\hat{p}_{H,i}(1 - \gamma_i)(1 - p_{B,i})B + \hat{\beta}_i(1 - \hat{p}_{H,i})\gamma_iH + (1 - \hat{\beta}_i)(1 - \hat{p}_{B,i})B \quad (20)$$

Or if:

$$\hat{\beta}_i\hat{p}_{H,i}(1 - \gamma_i)B - \hat{\beta}_i\hat{p}_{H,i}(1 - \gamma_i)(1 - p_{B,i})B - \hat{\beta}_i\hat{p}_{H,i}\gamma_i(1 - p_{H,i})H > 0 \quad (21)$$

Or if

$$\frac{\gamma_iH}{(1-\gamma_i)B} < \frac{p_{B,i}}{(1-p_{H,i})} \text{ or } d_{B,i} > s_i \quad (19' \text{ repeated})$$

Thus, a sufficient condition for the $PBD LS_i$ to be superior to the $PBND LS_i$ is that the strength of the presumption of illegality of the conduct is lower than the discriminatory power of $PBD LS_i (d_{B,i})$ following the investigation in step i. This condition for discriminatory conducts to lower DEC – called *condition for effective discrimination* – was first put forward by Katsoulacos and Ulph (2009)⁵⁷.

Finally, and most importantly, we examine when an additional assessment step (taking a further step in the analysis of the conduct's effects) will lower DEC, for stages $i = 1, \dots, N-1$. We focus our discussion on the comparison between discriminatory LSs in stages i and $i+1$, $i = 1, \dots, N-1$ and so compare DEC of $PBD LS_i$ to the DEC of $PBD LS_{i+1}$.

Taking an additional assessment step will lower the DEC ie. $DEC PBD LS_i > DEC PBD LS_{i+1}$ if:

$$\hat{\beta}_i \hat{p}_{H,i} \gamma_i (1 - p_{H,i}) H + \hat{\beta}_i \hat{p}_{H,i} (1 - \gamma_i) (1 - p_{B,i}) B + \hat{\beta}_i (1 - \hat{p}_{H,i}) \gamma_i H + (1 - \hat{\beta}_i) (1 - \hat{p}_{B,i}) B > \hat{\beta}_{i+1} \hat{p}_{H,i+1} \gamma_{i+1} (1 - p_{H,i+1}) H + \hat{\beta}_{i+1} \hat{p}_{H,i+1} (1 - \gamma_{i+1}) (1 - p_{B,i+1}) B + \hat{\beta}_{i+1} (1 - \hat{p}_{H,i+1}) \gamma_{i+1} H + (1 - \hat{\beta}_{i+1}) (1 - \hat{p}_{B,i+1}) B$$

Consider the DEC of False Acquittals (FA) and False Convictions (FC) at stage i. These are given by:

$$DEC FA_i = \hat{\beta}_i \hat{p}_{H,i} \gamma_i (1 - p_{H,i}) H + \hat{\beta}_i (1 - \hat{p}_{H,i}) \gamma_i H = \hat{\beta}_i \gamma_i (1 - \hat{p}_{H,i} p_{H,i}) H \quad (22)$$

and

$$DEC FC_i = \hat{\beta}_i \hat{p}_{H,i} (1 - \gamma_i) (1 - p_{B,i}) B + (1 - \hat{\beta}_i) (1 - \hat{p}_{B,i}) B \quad (23)$$

Comparing (22) to (23) we get an exact characterisation of the factors that determine FA and FC and thus can determine under what conditions the Easterbrook (1984) hypothesis that led to what Hovenkamp (2021) calls “an anti-enforcement bias in antitrust”, namely that expected error costs from FC are higher than from FA. Specifically, we see that:

Lemma 2: the Easterbrook (1984) hypothesis is likely to be valid (i.e. for $DEC FC_i > DEC FA_i$), when:

- $\hat{\beta}_i$, the degree of prevalence of precondition i is small (e.g. for stage 1, that the prevalence of dominant firms is small);
- $\hat{p}_{H,i}$ and $p_{H,i}$ are large, i.e. we can identify when conduct is harmful with a high degree of accuracy, while $p_{B,i}$ is small, i.e. we cannot identify when conduct is benign with a high degree of accuracy;
- γ_i is small, so the likelihood that the specific conduct type investigated is genuinely harmful, is small;
- B is large relative to H.

Hovenkamp (2021), criticizes particularly the Easterbrook (1984) assumption that B is likely to be larger than H, but we see from the above comparison of the DEC from FC and from FA

⁵⁷ See also their paper inEJLE

that even if this were to be true there is no obvious reason to expect that $DEC_{FC_i} > DEC_{FA_i}$.

To proceed further, assume in a first go of analysis of the DECs, that $\hat{p}_{B,i} = 1$. Then, adding DEC from FAs and from FCs ((22) and (23)), we get:

$$DEC_i = \hat{\beta}_i \hat{p}_{H,i} (1 - \gamma_i) (1 - p_{B,i}) B + \hat{\beta}_i \gamma_i (1 - \hat{p}_{H,i} p_{H,i}) H$$

or

$$DEC_i = \hat{\beta}_i (1 - \gamma_i) B \left[(1 - p_{B,i}) \hat{p}_{H,i} + \frac{\gamma_i H}{(1 - \gamma_i)} (1 - \hat{p}_{H,i} p_{H,i}) \right] \quad (24)$$

or

$$DEC_i = \hat{\beta}_i (1 - \gamma_i) B \left[\frac{1}{d_{H,i}} \hat{p}_{H,i} p_{H,i} + s_i (1 - \hat{p}_{H,i} p_{H,i}) \right] \quad (25)$$

or

$$DEC_i = \hat{\beta}_i (1 - \gamma_i) B \left[s_i - \left(s_i - \frac{1}{d_{H,i}} \right) \hat{p}_{H,i} p_{H,i} \right] \quad (26)$$

Where $d_{H,i}, s_i > 1$.

Proposition 4: conditions for taking additional assessment steps, for stages $i = 1, \dots, N-1$:

From (26), the impact on DEC of undertaking an additional assessment step – going from i to $i+1$ – is determined by four factors, two of which tend to lower DEC, one tends to raise DEC while another one has an ambiguous effect:

- (1) $(1 - \gamma_i) \hat{\beta}_i$ – this is the probability that the conduct for which precondition i (and the previous preconditions) hold, is *not* harmful: as shown above this probability is reduced with i so, from (26) above, this tends to lower DEC when an additional investigation is undertaken;
- (2) s_i – this is the strength of the presumption of illegality in stage i : as shown above this increases with i , so from (26) this tends to make higher the DEC when an additional investigation is undertaken;
- (3) $d_{H,i}$ – this measures the discriminatory power of the investigation in stage i : as shown above this increases with i , so from (26) this tends to lower DEC when an additional investigation is undertaken;
- (4) $\hat{p}_{H,i} p_{H,i}$ – this is the probability that the harm-conducive precondition i is correctly recognised as holding and conduct is then correctly recognised as harmful: assuming that the information produced by additional investigative steps improves (increases) this probability, that is that this probability increases with i , from above, this tends to make DEC lower when an additional investigation is undertaken – however, while we may expect $p_{H,i}$ to increase with i , this is not obvious at all for $\hat{p}_{H,i}$, so it is not *a priori* clear whether this factor will tend to lower or raise DEC when additional investigations are undertaken.

Including also the term on DEC from FC, that was not taken into account above (adding the second term of (23) to (26)) we get:

$$DEC_i = \hat{\beta}_i(1 - \gamma_i)B \left[s_i - \left(s_i - \frac{1}{d_{H,i}} \right) \hat{p}_{H,i} p_{H,i} \right] + (1 - \hat{\beta}_i)(1 - \hat{p}_{B,i})B \quad (27)$$

There are a number of additional comments to make here, in addition to our comments above on the factors that affect DEC when an additional assessment step is undertaken.

- (i) Considering the second term on the RHS of (27), the fact that the probability $\hat{\beta}_i$, that successive preconditions are all satisfied, falls with increased i implies that the probability $(1 - \hat{\beta}_i)$ will increase with increased i this been a factor tending to increase DEC. However, it is not possible to sign generally the derivative of DEC_i with respect to $\hat{\beta}_i$.
- (ii) When $\hat{p}_{B,i}$, increases with i so the probability $(1 - \hat{p}_{B,i})$ of not recognising that precondition i is not satisfied decreases with i this will tend to reduce DEC when additional stages of the investigation are undertaken. As noted above when commenting on $\hat{p}_{H,i}$ we cannot a priori say whether $\hat{p}_{B,i}$ will increase with i , this very much depending on the exact type of conduct under examination and the context under which it is undertaken.
- (iii) Taking into account the previous comments and (ii), as we would expect, an improvement (increase) in the value of the discriminating parameters will unambiguously reduce DEC.

One last result concerns the comparison between the RoR LS, that involves undertaking also the last assessment stage (stage 4 in our context), with using a LS that stops short of this last stage in the investigation. Let us consider in particular whether it is optimal to undertake this last additional step – which involves comparing DEC of stage 3 to DEC of Stage 4, assuming that in stage 3 a PBD LS is used – the comparison with PBD LS for stage 3 is then obvious given Proposition 3.

From equations (22) and (23) for $i = 3$ and equation (14) for $i = 4$, let us compare DEC from FAs and DEC from FCs for these two LSs. We get:

Proposition 5: (a) it is sufficient (though not necessary) condition for the last assessment step to lower the DEC from FAs is that the probability of identifying the precondition in step 4 ($\hat{p}_{H,4}$) is not much lower than it is for step 3 (or, $\hat{p}_{H,3} \leq \hat{p}_{H,4}$). (b) However, the last step can decrease or increase FCs, so the overall effect on DEC is ambiguous. Using a set of reasonable parameter values we provide two example in which the overall effect is that DEC decrease by undertaking the last step.

Proof: to see (a) note that

$$DEC FA_3 = \hat{\beta}_3 \gamma_3 (1 - \hat{p}_{H,3} p_{H,3}) H \quad (28)$$

and

$$DEC FA_4 = \hat{\beta}_4 (1 - \hat{p}_{H,4}) H \quad (29)$$

Thus, given that $\gamma_3 = \beta_4$ and so $\hat{\beta}_3\gamma_3 = \hat{\beta}_4$

$$DEC FA_4 < DEC FA_3 \text{ if } p_{H,3}\hat{p}_{H,3} < \hat{p}_{H,4} \quad (30)$$

For (b) we need to compare:

$$DEC FC_3 = \hat{\beta}_3\hat{p}_{H,3}(1 - \gamma_3)(1 - p_{B,3})B + (1 - \hat{\beta}_3)(1 - \hat{p}_{B,3})B \quad (31)$$

with

$$DEC FC_4 = (1 - \hat{\beta}_4)(1 - \hat{p}_{B,4})B \quad (32)$$

We note first that, given that $\hat{\beta}_3 > \hat{\beta}_4$

$$(1 - \hat{\beta}_3)(1 - \hat{p}_{B,3}) < (1 - \hat{\beta}_4)(1 - \hat{p}_{B,4})$$

for as long as $\hat{p}_{B,4}$ is not much larger than $\hat{p}_{B,3}$.

However, $DEC FC_3$ will tend to be greater than $DEC FC_4$ due to the first term on the RHS of (31). So we cannot say unambiguously whether the last investigative step will decrease or increase DECs.

To get a feeling of how DEC and its components (cost from FA and from FC) will compare let us illustrate using a numerical example with reasonable values for the parameter values – though for a conduct type for which the expected fraction of harmful cases is very small, which does not favour the use of effects-based). Specifically, assume that dominant firms make up 10% of the population (so to undertake the conduct it is not necessary to possess significant market power), cases with exclusionary effects by dominant firms are 40%, cases where exclusionary effects are associated with consumer welfare loss if no account is taken of efficiencies are 70% and cases with no significant efficiencies to outweigh the loss in consumer welfare are 50%. That is:

$$\beta_1 = 0.1, \beta_2 = 0.4, \beta_3 = 0.7, \beta_4 = 0.5$$

So:

$$\hat{\beta}_1 = \beta_1 = 0.1, \hat{\beta}_2 = \beta_1\beta_2 = 0.1 * 0.4 = 0.04, \hat{\beta}_3 = \beta_1\beta_2\beta_3 = 0.1 * 0.4 * 0.7 = 0.028, \\ \hat{\beta}_4 = \beta_1\beta_2\beta_3\beta_4 = 0.1 * 0.4 * 0.7 * 0.5 = 0.014;$$

And so:

$$(1 - \hat{\beta}_1) = 0.9, (1 - \hat{\beta}_2) = 0.96, (1 - \hat{\beta}_3) = 0.972, (1 - \hat{\beta}_4) = 0.986$$

$\gamma_3 = \beta_4 = 0.5$ and $\gamma_0 = \hat{\beta}_4 = 0.014$ so less than 1,5% of cases of the conduct type are harmful.

Assume also that, discriminating power is not very high:

$$\hat{p}_{H,3} = \hat{p}_{B,3} = p_{H,3} = p_{B,3} = 0.6 = \hat{p}_{B,4} = \hat{p}_{H,4}$$

Then:

$$DEC FA_3 = 0.00896H$$

$$DEC FA_4 = 0.0056H$$

So there is a 37.5% reduction in the DEC of FAs from the last step.

$$DEC FC_3 = (0.00336 + 0.3888)B = 0,39216B$$

$$DEC FC_4 = 0,3944B$$

So there is a very small (0,0057%) increase in the DEC of FCs from the last step.

In order to compare overall DEC, we need to assign values to H and B. To do that we note that in order for the conduct to be PL in stage 0 and PI in stage 1, given the values of the parameters above, the value of H must be higher than 6,17B. Let us assume that $H = 7B$. Then:

$$DEC_3 = 0.00896 * (7B) + 0,39216B = 0.4548B$$

$$DEC_4 = 0.0056 * (7B) + 0,3944B = 0.4336B$$

So the last investigative step reduces DEC by about 4.66%. While the last step is preferred in terms of minimising DEC, given the additional implementation cost of the last step it may seem optimal not to undertake this step. (WE CAN THINK OF A RULE, LIKE THE DEC MUST DECREASE BY AT LEAST 5% OR SOMETHING LIKE THIS TO JUSTIFY THE EXTRA COST OF TAKING AN ADDITIONAL STEP).

Comment – another scenario:

For some conducts a more reasonable set of parameter values would be:

$$\beta_1 = 0.5, \beta_2 = 0.7, \beta_3 = 0.9, \beta_4 = 0.8$$

(or even higher values of β_1).

In this case:

$$\gamma_3 = \beta_4 = 0.8, \gamma_1 = 0,504$$

$$\text{and } \gamma_0 = \hat{\beta}_4 = 0.252$$

In this case, the conduct is PL in stage 0 and PI in stage 1 with approx.. equal H and B. Assume that the values of the discriminating parameters are as before.

Then:

$$DEC FA_3 = 0.16128H$$

$$DEC FA_4 = 0.1008H$$

So there is the same 37.5% reduction in the DEC of FAs from the last step. This is as we expect since $\hat{\beta}_3 \gamma_3 = \hat{\beta}_4$ and the discriminating parameters are the same. Now:

$$DEC FC_3 = (0.01512 + 0.274)B = 0,28912B$$

$$DEC FC_4 = 0,2968B$$

So there is a 2,65% increase in the DEC of FCs from the last step.

We compare overall DEC's assuming that $H = B$ (having H been much larger or even larger than B may appear unreasonable to some that think that false convictions are the important errors). Then:

$$DEC_3 = 0.16128B + 0.28912B = 0.4504B$$

$$DEC_4 = 0.1008B + 0.2968B = 0.3976B$$

So the last investigative step reduces DEC significantly by about 11.7%.

Increasing the value of the discriminating parameters

Assume that these increase but remain all the same, so:

$$\hat{p}_{H,3} = \hat{p}_{B,3} = p_{H,3} = p_{B,3} = 0.8 = \hat{p}_{B,4} = \hat{p}_{H,4}$$

We know from Result 4 that this will reduce DEC's. We confirm this here and show that the decrease will be greater in investigative step 4 (relative to the decrease in step 3). So:

$$DEC FA_3 = 0.0972H$$

$$DEC FA_4 = 0.0504H$$

So while the DEC of FA are reduced in step 3 and step 4, as we expected, the reduction is greater in step 4, so now there is a 44.4% reduction in the DEC of FAs from the last step.

Concerning the DEC from FCs:

$$DEC FC_3 = (0.01008 + 0.137)B = 0.14708B$$

$$DEC FC_4 = 0.1496B$$

So there is a significant reduction in the DEC of FC in both steps and, now, especially in step 3: the DEC from FC are still lower in step 4 but now by only 1.7% relative to step 3.

Comparing overall DEC's assuming that $H = B$ we get:

$$DEC_3 = (0.09072 + 0.14708)B = 0.2378B$$

$$DEC_4 = (0.0504 + 0.1496)B = 0.2B$$

So the last investigative step now reduces overall DEC even more than in the previous scenario - by about 15.9%.

4. Conclusions

At least since Easterbrook (1984), decision theoretic principles have provided the fundamental framework for analysing the choice of legal standards in competition law enforcement. The various elements of this framework have been discussed in detail and have been applied in examining what should be the LS adopted in the assessment of specific conducts, by a number of important subsequent contributions. However, these did not provide a formal and general, yet simple representation that could guide policy in practice, in

terms of a condition, expressed by a simple formula, of how the fundamental pertinent factors interact thus determining the optimal LS. This was done by Katsoulacos and Ulph (2009), albeit by relying on a significant abstraction, focusing on the comparison of the two extremes of Strict Per Se and the full Effects-based (or rule of reason) LS, ignoring the fact that CAs could choose, and they usually do, LSs intermediate between these two extreme LSs.

In this article, we re-visit our previous contribution providing a much more detailed description of the process for choosing LSs, when the latter are distinguished by the extent to which they rely on additional information gathering investigations. Each successive investigation examines whether additional preconditions, that are recognised as contributing to conducts having adverse welfare effects are satisfied. Following the suggestion of Breckner and Salop (1999), we formulate and formalise a detailed methodology “for determining when to make (liability) decisions on the basis of current information and when to gather and consider further information before making a decision”. Further, in each stage of the process, given the information gathered up to that stage, we examine and compare LSs that rely on presumptions about the effect on welfare if just the preconditions up to that stage are satisfied, banning *all* conducts for which the preconditions are satisfied, to LSs that *discriminate* between whether specific conducts for which the preconditions are satisfied are harmful or benign. Simple formulae are derived that describe how to *determine whether a CA should rely on presumptions or discrimination and the value of additional information, in terms of lowering the costs of decision errors, relative to the costs of decision errors without this additional information.*

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